NON-PUBLIC?: N
ACCESSION #: 9105300097
LICENSEE EVENT REPORT (LER)

FACILITY NAME: DIABLO CANYON UNIT 1 PAGE: 1 OF 7

DOCKET NUMBER: 05000275

TITLE: MANUAL REACTOR TRIP CAUSED BY ROD CONTROL POWER SUPPLY FUSE
FAILURE DUE TO PERSONNEL ERROR
EVENT DATE: 04/24/91 LER #: 91-008-00 REPORT DATE: 05/23/91

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 2 POWER LEVEL: 002

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Martin T. Hug, Senior Regulatory TELEPHONE: (805) 545-4005
Compliance Engineer

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: AA COMPONENT: FU MANUFACTURER: S156
REPORTABLE NPRDS: Yes

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 24, 1991, at 1827 PDT, with Unit 1 in Mode 2 (Startup) at 2 percent power, a plant operator manually tripped the reactor due to inability to manually move control rods into the core due to a rod control urgent failure alarm condition.

Immediately preceeding the trip, on April 24, 1991, at 1819 PDT, the unit had been taken critical and reactor power stabilized for plant testing. Following initial data collection, the plant operator stepped control rods out to increase power to approximately 2.0 percent reactor thermal power (RTP) for further testing. At 1822 PDT, a rod control urgent failure alarm was received in the control room. Plant operators confirmed that manual rod control was inhibited, confirmed locally that rod control power cabinet PN1AC had an urgent failure, and initiated a

manual reactor trip to terminate the power increase at approximately 2.5 percent RTP. On April 24, 1991, at 2054 PDT, a four-hour, non-emergency notification was made in accordance with 10 CFR 50.72(b)(2)(ii).

The root cause of this event is unknown. However, based on investigations of possible causes, PG&E believes that the most probable root cause is personnel error. Due to misleading information contained in a 1989 work order, a contract electrician had replaced the power supply fuses in the wrong electrical cabinet thereby inadvertently leaving low reliability fuses in the system. Corrective actions to prevent recurrence include labeling of the fused disconnect panels for the rod control system and tailboarding of maintenance personnel.

5368S/0085K

END OF ABSTRACT



I. Plant Conditions

Unit 1 was in Mode 2 (Startup) at 2.5 percent power.

II. Description of Event

A. Event:

On April 24, 1991, at 1819 PDT, Unit 1 was taken critical and Reactor Thermal Power (RTP) was stabilized at 10 E-08 amps as indicated on the intermediate range nuclear instrumentation (IG) to record plant data. Following data collection, the control operator began withdrawal of the control rods (AA) to establish a positive start-up rate to take RTP to the point of adding heat.

On April 24, 1991, at 1822 PDT, "Rod Control Urgent Failure" (PK03-17) alarmed in the control room. This alarm inhibited the rod control system (AA) from moving the control rods into the core to terminate the power increase.

Operations personnel were sent to the rod control power supply (AA) cabinet to determine the cause of the urgent failure alarm. The senior control operator reported that power supply cabinet PN1AC had the urgent failure alarm. Due to a slightly positive moderator temperature coefficient at Beginning of Life (BOL) core conditions, RTP increased beyond the intended power

level and continued to rise. Plant operators attempted to insert Control Bank D (AA) in the individual bank select from the control room selector. When this was unsuccessful, the shift foreman and shift supervisor concluded that a manual reactor trip was warranted, and the shift foreman ordered the control operator to manually trip the reactor (AC).

On April 24, 1991, at 1827 PDT, the control operator tripped the reactor from a RTP of approximately 2.5 percent.

On April 24, 1991, at 2054 PDT, a four-hour, non-emergency notification was made in accordance with 10 CFR 50.72(b)(2)(ii).

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times for Major Occurrences.

1. April 24, 1991, at 1822 PDT: A rod control urgent failure alarm was received in the control room.



2. April 24, 1991, at 1827 PDT: Unit 1 was manually tripped after unsuccessful attempts to regain positive rod control.

3. April 24, 1991, at 2054 PDT: The four-hour, non-emergency report required by 10 CFR 50.72 (b)(2)(ii) was made.

D. Other Systems or Secondary Functions Affected:

None.

E. Method of Discovery:

The event was immediately known to plant operators due to alarms received in the control room.

F. Operators Actions:

Plant operators initiated a manual reactor trip to terminate the event as directed by the shift foreman.

G. Safety System Responses:

The reactor trip breakers (AA)(BKR) opened and rods were inserted into the core terminating the event.

III. Cause of the Event

A. Immediate Cause:

One of the three phase fuses (AA)(FU) inside one of the three bus duct fused disconnect panels for the rod control power supply cabinet (PN1AC) failed.

B. Root Cause:

Upon inspection of the fuses, it was determined that three of the nine fuses were of an "old" style fuse that was known by plant operators and technicians to have had reliability problems, as documented in a 1987 nonconformance report (NCR) DC1-87-TI-N109 (see Section V.B for related LER 1-87-016). Resolution of this problem required as a corrective action that all "old" style 30 amp fuses in the rod control system be replaced with "new" style fuses. Corrective action work orders to replace the "old" fuses were issued and implemented during the Unit 1 third refueling outage in 1989.



The corrective action work orders were reviewed to determine why the recently failed bus duct fuses were not replaced. A review of work order C0038363 found that the "old" bus duct fuses were documented as being properly replaced on October 19, 1989.

The root cause of the failure to replace the "old" bus duct fuses is unknown. However, three possible cause scenarios were identified. Based on investigations of these possible causes, PG&E believes that the most probable root cause is personnel

error (scenario no. 3). Due to misleading information contained in 1989 corrective action work order C0038363, a contract electrician replaced power supply fuses in the wrong electrical cabinet. The electrician replaced nine fuses in panel PN1AC instead of the intended three fuses in the bus duct disconnect, thereby inadvertently leaving low reliability fuses in the system.

The possible root cause scenarios and investigations are summarized below:

1. The wrong part may have been withdrawn from warehouse stock.

Investigation. This possible cause was eliminated because corrective action taken for the initial problem identified in 1987 (NCR DC1-87-TI-N109) included the removal of all "old" fuses from warehouse stock and required receipt inspection of "new" replacement fuses. Also, an examination of the present warehouse stock found no further evidence of "old" fuses.

2. The wrong part may have been obtained and installed from other stock.

Investigation. This possible cause was eliminated because the replacement work order (C0038363) specified the correct part for the failed location. This was confirmed by an attached warehouse withdrawal slip from a receipt inspected "new" fuse purchase order.

3. The wrong fuses (i.e., the rod control power cabinet instead of the bus duct disconnect) were replaced, leaving the "old" fuses in place.

Investigation. This possible cause is considered credible. A review of the replacement work order (C0038363) identified that the following misleading information was provided to the contract electrician:

a. The scope of the work order identified the location of the bus duct disconnect as "above panel PN1AC"; however, the

work plan activity line only stated "replace fuses in fused disconnects."

b. The job required replacement of three bus duct disconnect fuses; however, nine fuses were provided with the work order. Coincidentally, nine fuses identical to those provided with the work order are located within panel PN1AC.

C. Contributory Cause:

1. The issuance of the corrective action work orders in 1989 was based on a verbal request between I&C and electrical maintenance work planning department personnel. PG&E believes that this verbal request led to a miscommunication, resulting in the work planning department staging a total of nine fuses rather than the intended three fuses.

2. The bus duct fused disconnect panels were not uniquely labeled. This may have led the contract electrician to believe that he had replaced the fuses at the correct location.

IV. Analysis of the Event

The rod control system is a Design Class II system for positioning of the reactor control rods for reactor power modulation by manual or automatic control of control rod banks in a preselected sequence, and for manual operation of individual banks. The urgent failure alarm is actuated when any one of the preset parameters is actuated. This alarm, when received due to a power supply failure, inhibits further rod motion until the alarm condition is resolved. This control feature is provided to stop further rod action that may result in an unintended rod position. The rod control system is provided electrical power from the nonsafety-related motor generator set through the safety-related reactor trip breakers to the rod control system and the control rod grippers. The failure described in this LER had no effect on any safety-related portion of the reactor trip system. Therefore, the manual reactor trip initiated during this event represents a conservative course of action.

In the event of an increase in neutron flux at low power, the nuclear instrumentation system is designed to provide automatic

reactor trip signals. Two of these signals were available to terminate the unintended power increase in the unlikely event that manual operator action was not taken. The intermediate range neutron flux reactor trip is designed to trip the reactor when one of two intermediate range channels measures a power level greater than 25 percent RTP as stated in FSAR Update Section 15.2.1.1.2. The power range high neutron flux reactor trip (low setting) is designed to trip the reactor when two of four power range channels indicate a power level greater than 25 percent RTP as stated in FSAR Update Section



15.2.1.1.3. Both of these reactor trips require manual operator action to block the trips in order to intentionally increase RTP above 25 percent. Therefore, in the event that plant operators had not tripped the reactor manually, the reactor would have automatically tripped when the 25 percent RTP threshold was exceeded.

Therefore, based upon the above analysis, the health and safety of the public were not adversely effected, and there were no adverse consequences or safety implications resulting from this event.

V. Corrective Actions

A. Immediate Corrective Actions:

All the bus duct disconnect fuses for the rod drive control system were replaced.

B. Corrective Actions to Prevent Recurrence:

1. The bus duct disconnect panels will be uniquely labeled consistent with plant procedures.

2. The electrical maintenance manager will provide a tailboard briefing to maintenance personnel regarding this event, emphasizing how informal communication contributed to this event.

3. A review was conducted of plant procedures that administratively control the implementation of corrective actions required as the result of nonconforming

conditions. This review concluded that these administrative controls have been significantly strengthened since 1989 and, therefore, no further procedural changes are required.

VI. Additional Information

A. Failed Components:

Fuse (Shawmut model A60X30-1, Amp Trap, Type 1, Form 101, Gould Inc., Newbury Port, Ma.)

B. Previous LERs on Similar Events:

LER 1-87-016-01 (NCR DC1-87-TI-N109) - Control Rod Power Fuses

This LER a
dressed the failure of power fuses used in control rod drive cabinet 2AC, which caused control bank A to lock up. The cause of the fuse failure was poor connection of the end cap with the fusible link. A corrective action to prevent recurrence required





replacement of the bus duct disconnect fuses with a "new" style fuse. This corrective action would have prevented recurrence if the "new" style fuses had been installed as required.





Pacific Gas and Electric Company

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TWX 910-372-6587 Nuclear Power Generation

May 23, 1991

PG&E Letter No. DCL-91-137

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Re: Docket No. 50-275, OL-DPR-80
Diablo Canyon Unit 1
Licensee Event Report 1-91-008-00
Manual Reactor Trip Caused by Rod Control Power Supply Fuse
Failure Due to Personnel Error

Gentlemen:

Pursuant to 10 CFR 50.73(a)(2)(iv), PG&E is submitting the enclosed Licensee Event Report (LER) concerning a manual reactor trip caused by a rod control power supply fuse failure due to personnel error.

This event has in no way affected the health and safety of the public.

Sincerely,

J. D. Shiffer

cc: Ann P. Hodgdon
John B. Martin
Phillip J. Morrill
Paul P. Narbut
Harry Rood
CPUC
Diablo Distribution
INPO

DC1-91-EM-N046

Enclosure

5368S/0085K/JHA/2246

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